

Seeking Signs of Life in an Ancient Martian Hot Spring.

Completed Technology Project (2015 - 2018)



Project Introduction

Scientific/Technical/Management Science Goals and Objectives: A major goal of the NASA planetary space program has been the search for life in our solar system. On Mars, this effort has been focused on the successful search for water and habitability. The next step will be searching specific locations for signs of past life. One of the most promising places are the hydrothermal sinter deposits in the Nili Patera caldera of the Syrtis Major volcano. These deposits would have been long-lived, with the suitable environmental conditions and provide a well-mapped feature for a targeted mission. To prepare for this type of mission, we propose a series of experiments and field operations to develop the required methodologies. Operating at an extinct hot spring deposit in a Martian analog and extreme life environment in Iceland, we will collect samples and in-situ measurements to determine the resolutions and data sets required to answer the key mission objectives. We will also test trafficability to determine the spacecraft capabilities required for mission success. The proposed advancements break down into the categories of Science, Science Operations and Technology. Science objectives will focus building on the extensive set of terrestrial literature to answer questions specific to this mission. For example, how do we identify all potential signs of life preserved in the sinters and how to sinters record signs of environmental and volcanic properties. Specific to this proposal will be to understand what spacecraft instruments will be required to answer these questions. Science Operations will focus on the suite of instruments needed to operate together to answer the mission goals and what type of samples and mobility will be required for success. The Technology section will be to develop the methods to meet the requirements determined by the science effort. This includes sample collection and handling methodology and determining a plan to develop currently available field instruments into planetary capable versions. **Methodology:** Dr. Skok will lead a diverse team of hydrothermal, biological and instrumental experts to study a comparable hot spring deposit in Iceland to examine all the potential mission issues and scenarios, along with sample requirements. A combination of lab analysis of collected samples and in-situ deployment of field instruments will be used to prepare for this future mission. **Relevance to Planetary Science and Technology Through Analog Research:** This proposal meets the stated PSTAR goal of funding projects to planetary analog sites to develop the technologies and methodologies required for future missions, especially to extreme environments. Hot spring environments are key habitats on Earth and provide a planetary independent energy source and habitable zone.



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Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Responsible Program:

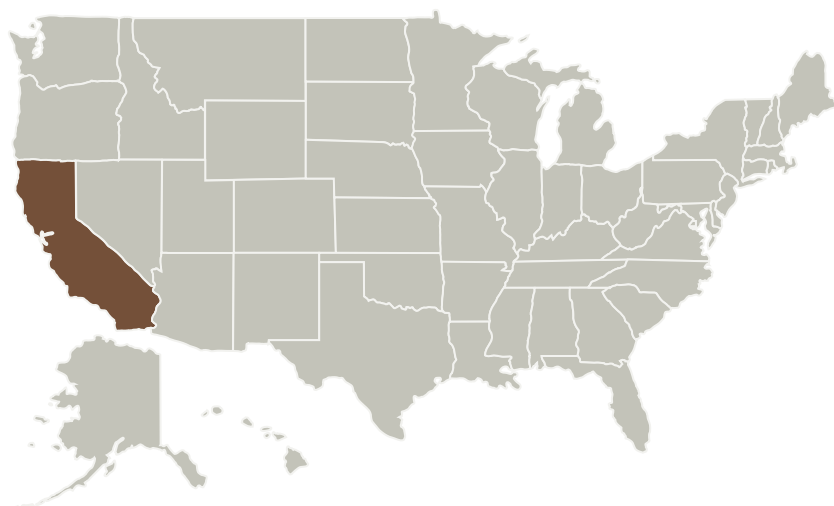
Planetary Science and Technology Through Analog Research

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
SETI Institute(SETI)	Supporting Organization	Academia	Moffett Field, California

Primary U.S. Work Locations

California

Project Management

Program Director:

Carolyn R Mercer

Program Manager:

Sarah K Noble

Principal Investigator:

John R Skok

Co-Investigator:

Barbara E Vance

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.3 Sample Handling

Target Destination

Others Inside the Solar System